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(54) ADVANCED WIRELESS PHONE SYSTEM

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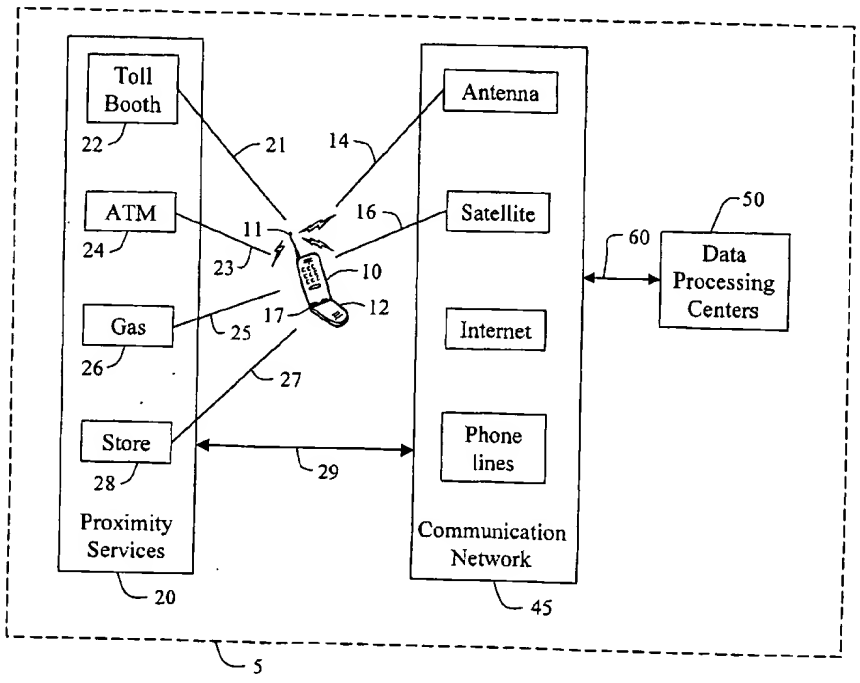
(57) ABSTRACT

A Wireless Phone/pager system is modified to allow an owner to have proximity services such as toll tag access, ATM dispensing, gas pump dispensing, store credit card checkout, television remote control, garage door access, and more services using their wireless Phone/pager. The modification is accomplished in such a way that the existing wireless phone/pager/palm computer systems and the proximity device processing units require very little modification but produce a truly Advanced Wireless Phone/pager/palm computer System (AWPS). The AWPS can be appended in a seamless manner to the existing wireless communication and proximity service provider systems in current use. The new system virtually eliminates the need to carry multiple credit cards and access devices such as toll tags. Another feature of the invention is the built-in finger print detector unit which automatically provides unique owner codes which can be used to either replace or supplement the PIN codes usually required with the proximity service providers. The system may also combine multiple proximity billing services with the Phone/pager service provider, i.e., another convenience that would be greatly appreciated by the consumer.



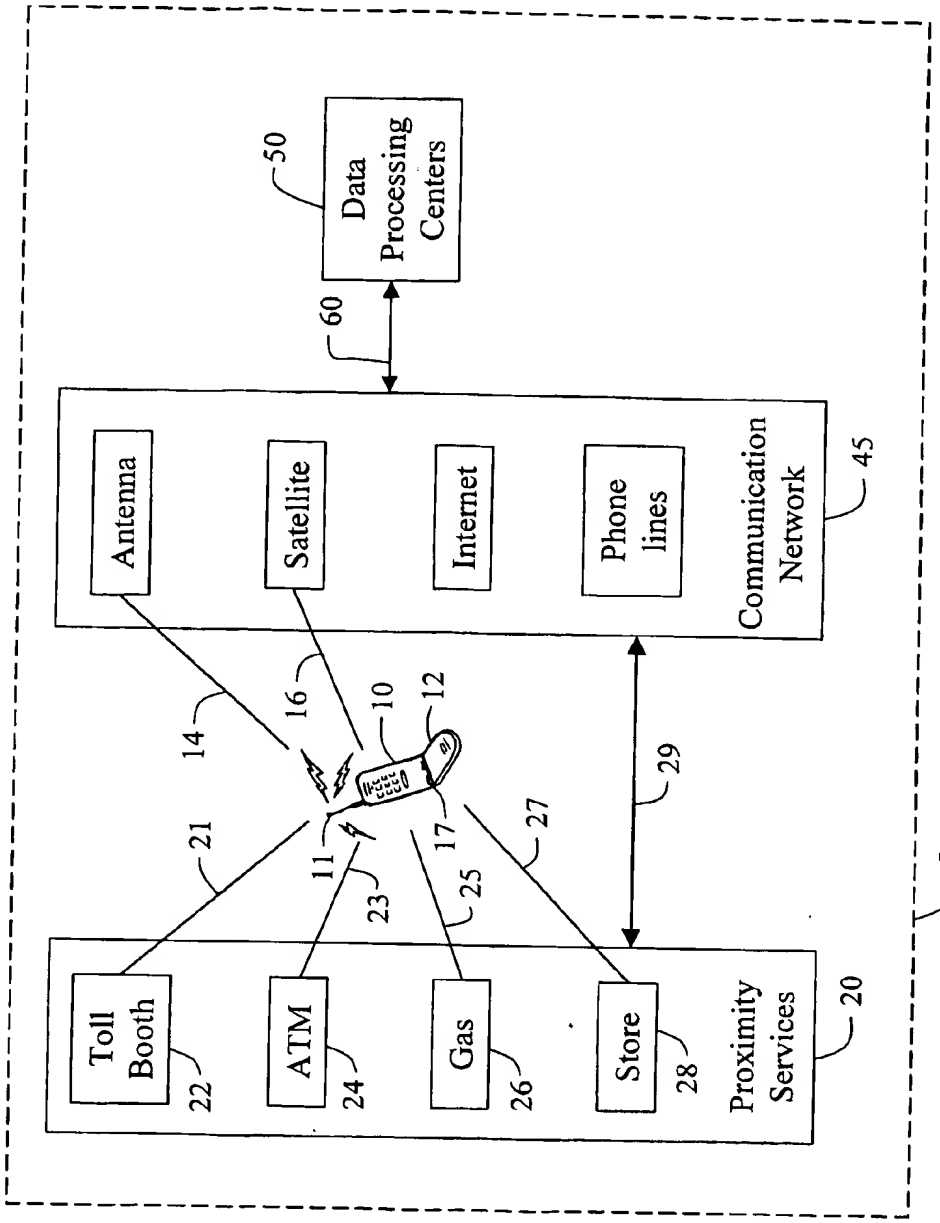

Data Processing Centers
50
60
Antenna
Satellite
Internet
Phone lines
Communication Network
45
14
16
10
12
29
21
11
23
17
25
27
5
Toll Booth
22
ATM
24
Gas
26
Store
28
Proximity Services
20

Fig. 1

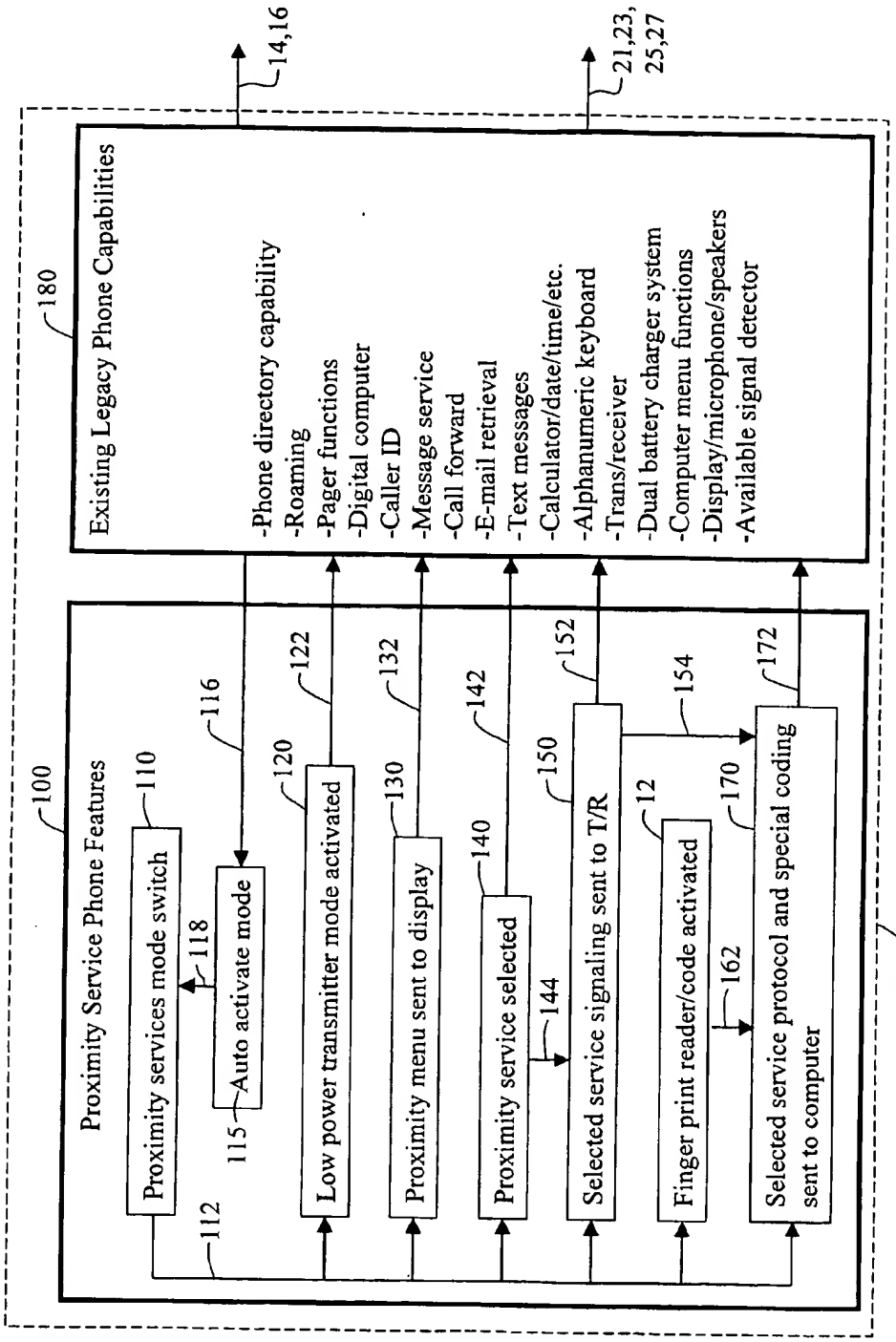

14,16
21,23,
25,27
180
Existing Legacy Phone Capabilities
-Phone directory capability
-Roaming
-Pager functions
-Digital computer
-Caller ID
-Message service
-Call forward
-E-mail retrieval
-Text messages
-Calculator/date/time/etc.
-Alphanumeric keyboard
-Trans/receiver
-Dual battery charger system
-Computer menu functions
-Display/microphone/speakers
-Available signal detector
100
Proximity Service Phone Features
110
Proximity services mode switch
112
116
115
118
Auto activate mode
120
122
Low power transmitter mode activated
130
132
Proximity menu sent to display
140
142
Proximity service selected
144
150
152
Selected service signaling sent to T/R
12
154
Finger print reader/code activated
162
170
172
Selected service protocol and special coding sent to computer
10

Fig. 2

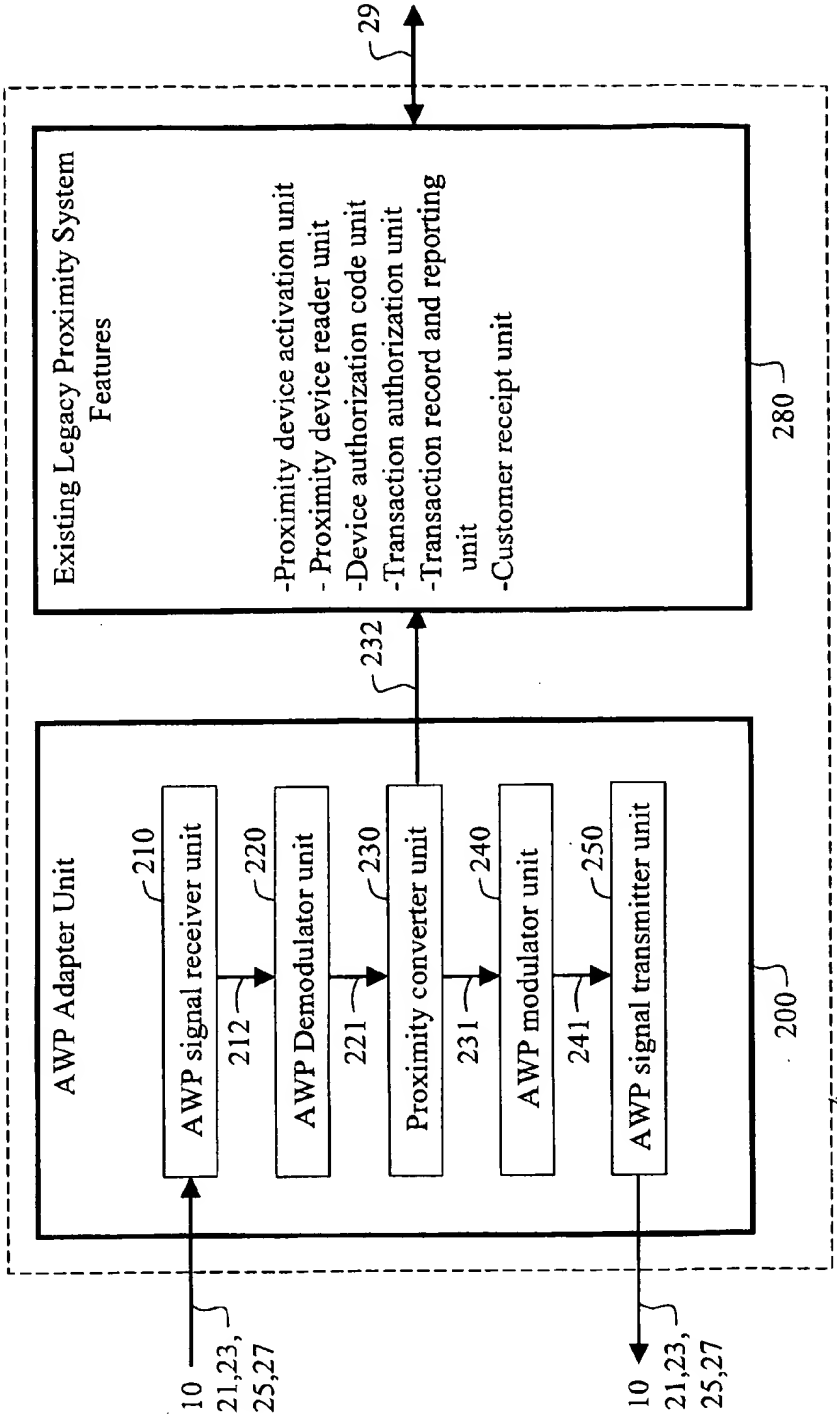

29
Existing Legacy Proximity System Features
-Proximity device activation unit
- Proximity device reader unit
-Device authorization code unit
-Transaction authorization unit
-Transaction record and reporting unit
-Customer receipt unit
280
232
AWP Adapter Unit
210
AWP signal receiver unit
212
220
AWP Demodulator unit
221
230
Proximity converter unit
231
240
AWP modulator unit
241
250
AWP signal transmitter unit
200
20
10
21,23,
25,27
10
21,23,
25,27

Fig. 3

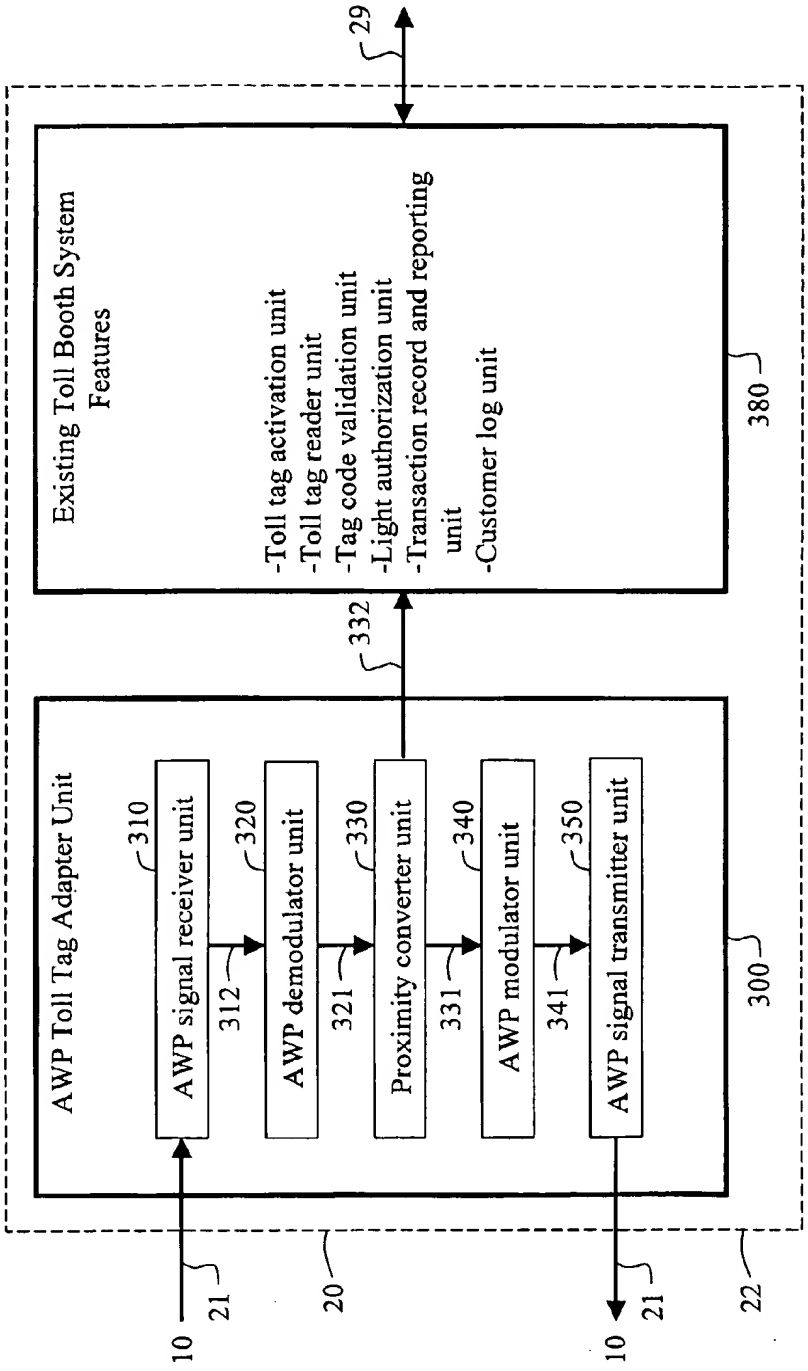

29
Existing Toll Booth System Features
-Toll tag activation unit
-Toll tag reader unit
-Tag code validation unit
-Light authorization unit
-Transaction record and reporting unit
-Customer log unit
380
332
AWP Toll Tag Adapter Unit
310
AWP signal receiver unit
312
320
AWP demodulator unit
321
330
Proximity converter unit
331
340
AWP modulator unit
341
350
AWP signal transmitter unit
300
10
21
20
10
21
22

Fig. 4

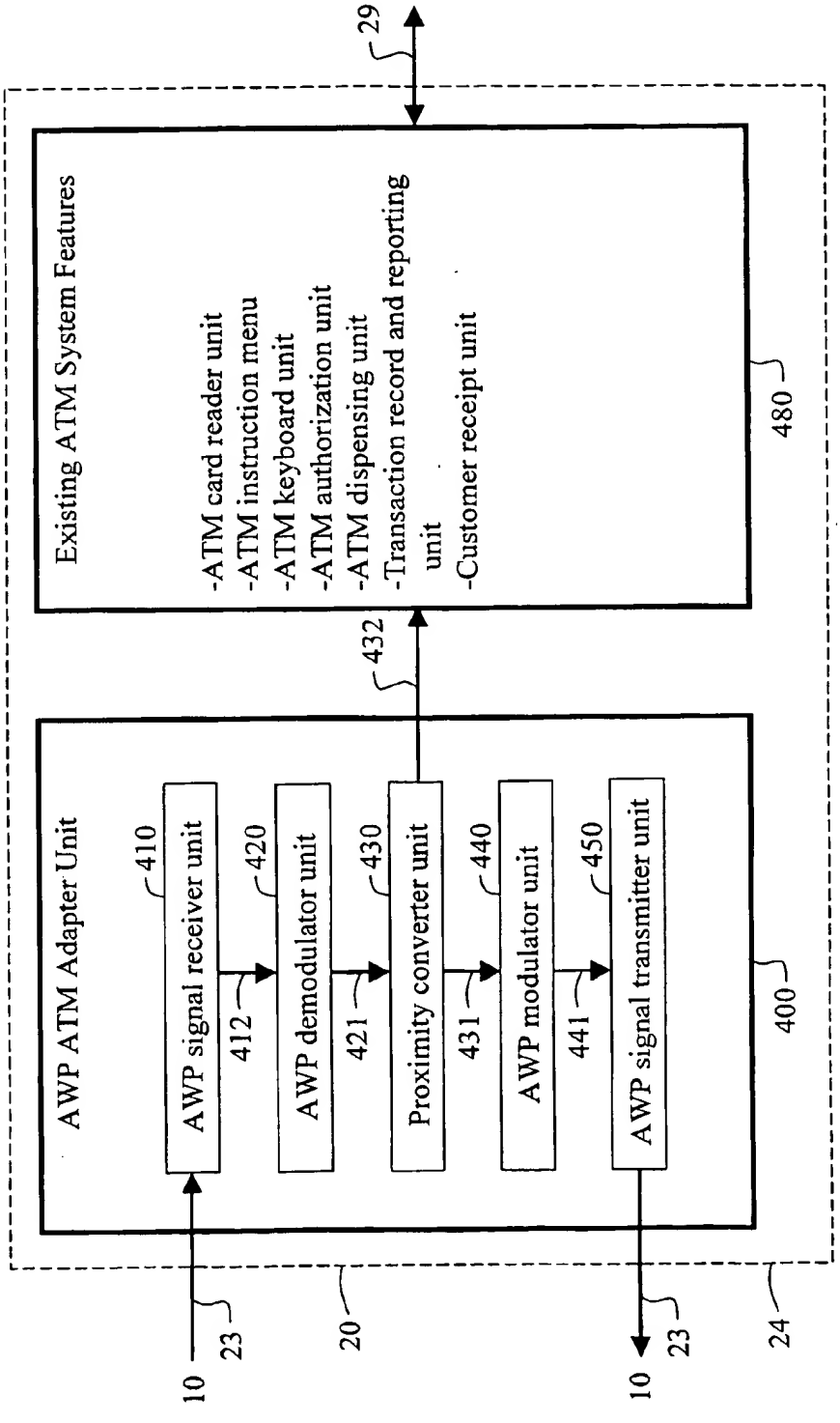

29
Existing ATM System Features
-ATM card reader unit
-ATM instruction menu
-ATM keyboard unit
-ATM authorization unit
-ATM dispensing unit
-Transaction record and reporting unit
-Customer receipt unit
480
432
AWP ATM Adapter Unit
410
AWP signal receiver unit
412
420
AWP demodulator unit
421
430
Proximity converter unit
431
440
AWP modulator unit
441
450
AWP signal transmitter unit
400
10
23
20
10
23
24

Fig. 5

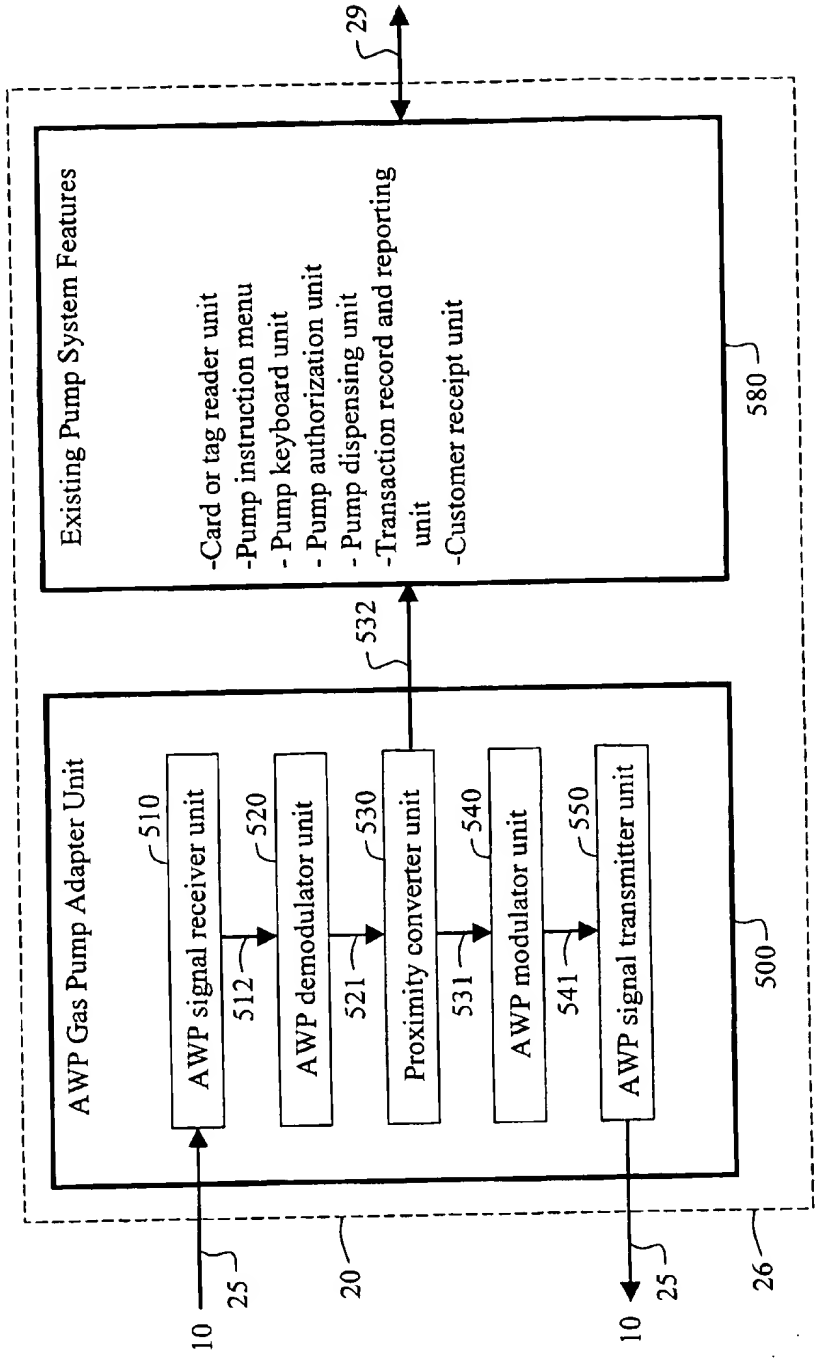

29
Existing Pump System Features
-Card or tag reader unit
-Pump instruction menu
- Pump keyboard unit
- Pump authorization unit
- Pump dispensing unit
-Transaction record and reporting unit
-Customer receipt unit
580
532
AWP Gas Pump Adapter Unit
510
AWP signal receiver unit
512
520
AWP demodulator unit
521
530
Proximity converter unit
531
540
AWP modulator unit
541
550
AWP signal transmitter unit
500
10
25
20
10
25
26

Fig. 6

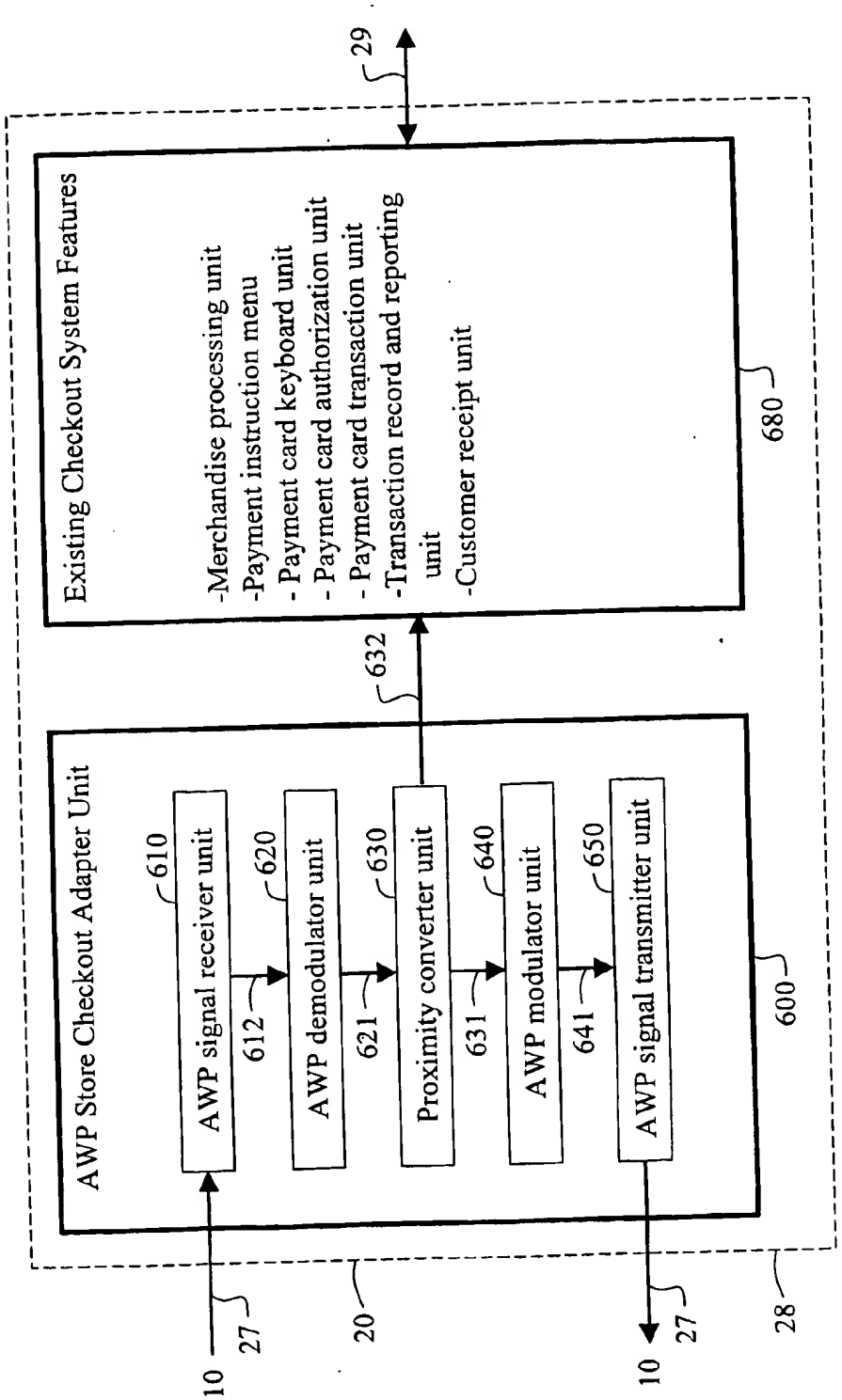

29
Existing Checkout System Features
-Merchandise processing unit
-Payment instruction menu
- Payment card keyboard unit
- Payment card authorization unit
- Payment card transaction unit
-Transaction record and reporting unit
-Customer receipt unit
680
632
AWP Store Checkout Adapter Unit
610
AWP signal receiver unit
612
620
AWP demodulator unit
621
630
Proximity converter unit
631
640
AWP modulator unit
641
650
AWP signal transmitter unit
600
10
27
20
10
27
28

Fig. 7

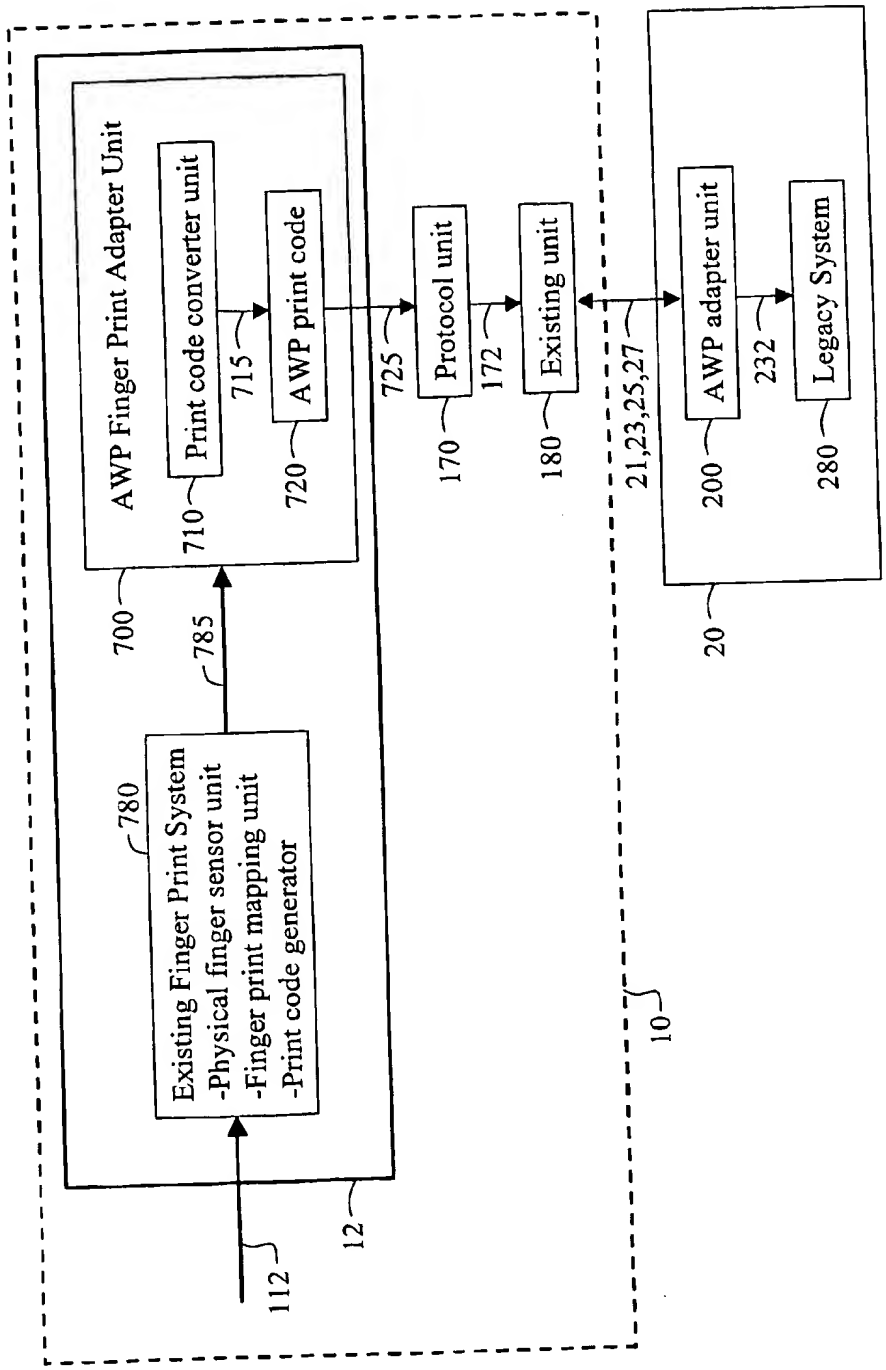

AWP Finger Print Adapter Unit
Print code converter unit
AWP print code
Existing Finger Print System
-Physical finger sensor unit
-Finger print mapping unit
-Print code generator
Protocol unit
Existing unit
AWP adapter unit
Legacy System
700
710
715
720
725
170
172
180
200
232
280
20
21,23,25,27
10
12
112
780
785

Fig. 8

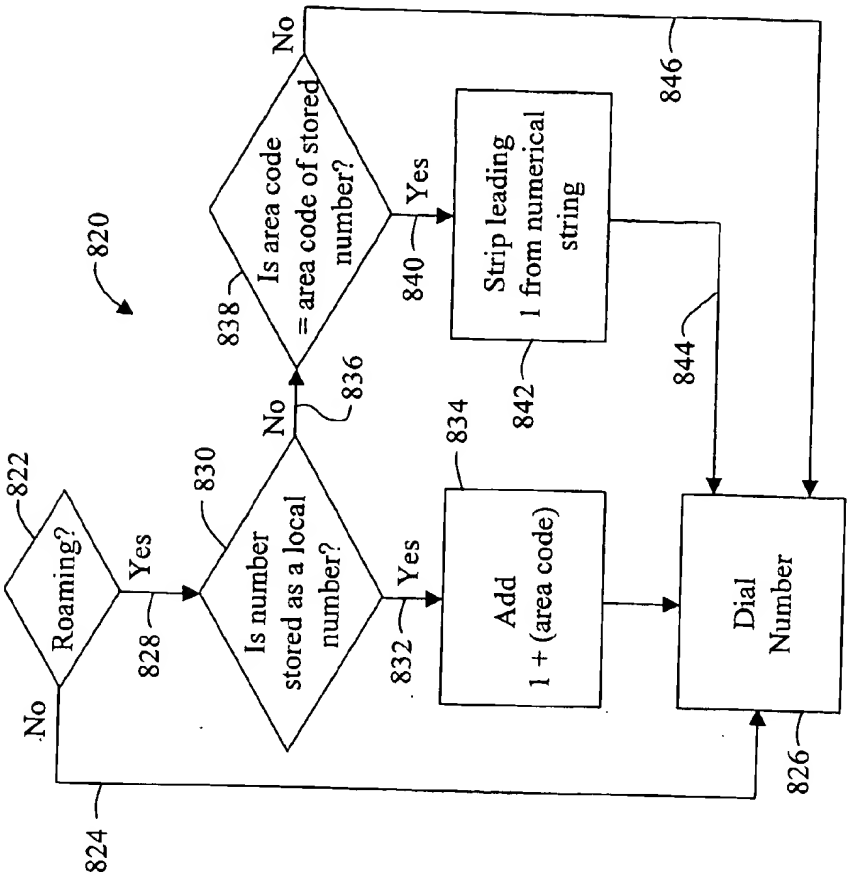

820
822
Roaming?
Yes
No
824
828
830
Is number stored as a local number?
Yes
No
832
834
Add 1 + (area code)
836
838
Is area code = area code of stored number?
Yes
No
840
842
Strip leading 1 from numerical string
844
846
Dial Number
826

Fig. 10

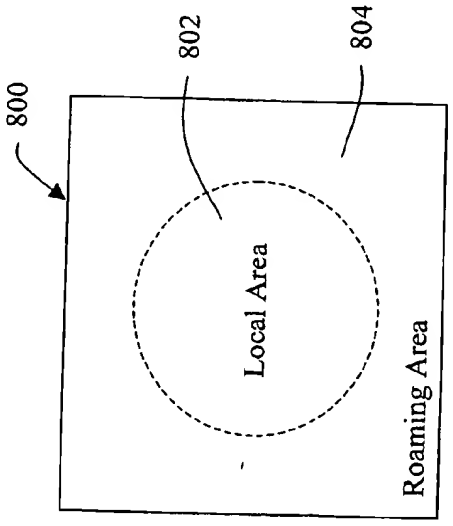

800
802
804
Local Area
Roaming Area

Fig. 9

ADVANCED WIRELESS PHONE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This is a continuation of U.S. Ser. No. 09/325,500, entitled Advanced Wireless Phone System, and filed on Jun. 3, 1999, the entire content of which is hereby incorporated herein by reference.

STATEMENT REGARD FEDERALLY SPONSORED RESEARCH AND DEVELOPMENT

[0002] Not Applicable.

BACKGROUND OF THE INVENTION

[0003] The wireless phone/pager industry is rapidly changing the way people are starting to communicate. New digital phones, such as the NOKIA 9000 communicator series and the Qualcomm pdQ smartphone, are incorporating into phone computers more and more pager and internet service provider services, along with limited computer capabilities for the customer. The legacy "land line and cable" phone system communication methods are rapidly being replaced or supplemented by these new digital wireless phones. The reason is simple; the mobile phones are both more convenient and, in many cases, becoming less expensive than legacy systems. This is especially true in many other countries that had limited or no legacy phone service, because the cost of the hardwire infrastructure was too great.

[0004] Before long, the new wireless phones may become a necessity for almost all individuals, even as those individuals still use conventional phones at home or in the office. The mobile office is truly becoming a way of life and phone makers are competing with computer makers for the "mobile office" market. However, all of these new, competing "digital wireless phones with built-in computers" and "palm computers with built-in phone/pager" systems are still focusing on bringing the customer a portable unit with longer life, E-Mail delivery capability, onboard phone book capability, more computer functions, roaming and other similar conveniences that used to require a computer and modem connected to a legacy phone system.

[0005] A Mobile Small Office-Home Office (SOHO) market is emerging and it is not at all like the computer industry envisioned several years ago, or the wireless phone/pager industry envisioned. At the same time, the communication bandwidth infrastructure such as Fiber Optics Cables, Low Orbit Satellites, Gigafrequency Microwave systems, is allowing the wireless phone/pager system to grow at a rate it never anticipated and many communication service providers are struggling just to handle new customers.

[0006] While digital technology has been fueling the wireless communication explosion, it also has been fueling rapid advances in other areas, such as credit card systems (debit cards, smart cards, etc.), e-commerce (ATM,s, WWW virtual stores), rapid gas delivery systems, rapid store check out systems, building access systems, and automated toll booth systems. These other areas will be referred to as the "proximity services" since in all cases the user must be close to a terminal (or proximity service provider) of some type to be serviced.

[0007] To date, the advances in the wireless industry, computer industry, and the multiple proximity service industry, have been vertical advances (improvements in the older systems) brought on by the rapid size and cost reductions in digital technology. As with most technology advances, there is normally a price to pay for this convenience. The price to pay with all of these ancillary proximity service systems has been, for the most part, the inconvenience of having to carry multiple cards or other access devices along with the codes required for maintaining a customer's privacy.

[0008] The inventor thinks it is now time to start replacing the multi-redundant system infrastructure with multiple integrated systems that allow a person to have all the modern rapid access conveniences without having to carry many cards or devices. It is to such a system that the present invention is directed.

[0009] This invention combines the advances in the wireless communication digital devices and infrastructure with the demands of the many proximity service providers, such as rapid access and card systems proliferating the economy, to reduce the number of items which an individual must carry to interface with these systems. This invention relates to a system that incorporates all of the rapid access signaling and card requirements into a portable electronic communication device, such as a wireless phone, wireless pager or a palm computer. With the described invention, a single device may allow both mobile SOHO services to be used in combination with the vast number of proximity services offered by proximity service providers, such as access and credit card services that meet the individual or business needs.

SUMMARY OF THE INVENTION

[0010] The new advanced wireless phone/pager system (AWPS) described herein combines the basic infrastructure and protocols to interface bi-directionally with proximity service providers, such as existing card and signaling access systems into a portable electronic device, such as a digital phone/pager capable of communicating bi-directionally with a communication service provider. The AWPS may also allow the means to decode these features to be placed on top of the legacy proximity service providers, such as the access and credit card reader systems. The new system refers to one key subsystem element as an Advance Wireless Phone/Pager (AWP unit or portable electronic communication device) to distinguish it from the Legacy wireless phone/pager, and the other key subsystem element as an Advanced Proximity Transmitter Receiver Unit (APTRU) to distinguish the portion added by this invention from the existing access and credit card reader systems functions already incorporated into these proximity service providers. The invention allows all of the card and other access device codes (personal information code) to be incorporated or stored in the AWP unit by remote control under the control of the proximity service provider although other suitable methods or apparatus can also be utilized, such as a keyboard.

[0011] The invention modifies the existing proximity service providers in a manner such that the existing proximity service providers can still use the regular access devices such as credit cards and toll tags and also communicate with the AWP unit. The small added cost to modify the existing proximity service units will be quickly paid for by the

increase in customer usage. A nice feature of the AWPS is that all of the access signaling to the proximity service provider can be done in a low power mode which does not decrease the life of the SOHO functions provided the AWP unit owner in todays legacy communication services.

[0012] That is, the AWP unit described in this invention may have a dual power capability (or other suitable system of bi-directionally communicating with the proximity service provider and the communication service provider) which can be used to service all of the ancillary access and other close proximity services that can become part of the AWP unit in the future. A notable one is automatic vehicle or individual location monitoring services (note AVM systems currently exist using cell phones but they operate in the high power mode and the resolution is no better than the wireless phone cell location distances). The communication service provider such as Sprint, SWBT, or Nextel could also be the billing company for many of these proximity service providers currently sending out separate bills. This would greatly lower the cost of collections currently being done by Highway Tolling authorities, Airport Tolling authorities, parking lot companies, and the numerous credit card companies. Such a consolidated collection system would greatly increase the convenience to the customer and lower the cost to the various proximity service providers. Thus one embodiment of the AWPS invention allows graceful and convenient conversion into the information age using an approach that allows gradual replacement of the legacy access and proximity signaling systems with a universal multi purpose mobile communication device. Equally important the new system allows a seamless conversion to a universal worldwide system that each country can use to eventually phase out their existing proximity service providers, such as the limited and specialized access and credit systems which will make travelling much more convenient.

[0013] The AWP unit can also incorporate the "alpha-numeric" worldwide communication features described in a co-pending patent application (Ser. No. 60/121,193), the disclosure of which is hereby incorporated herein by reference. That is, there will be no need for those who purchase AWP unit's to learn the various state and country legacy communication and access systems after the AWU's are incorporated on top of the legacy operating systems. Thus in the future only one customer device will be required to have multiple services (for example, up to 20 services) now requiring separate devices, and customer billing systems. The AWP unit is also suited for a third feature involving the code portion of the operating system. The AWP unit is ideally suited to generate a unique owner code which can be automatically inserted from the AWP unit using a fingerprint converter unit built into the AWP unit. That is, an owner fingerprint code would always be available when the owner was operating the AWP unit and could be used as the only security or additional security to a PIN number to greatly reduce both credit card fraud and illegal entry into buildings. The fingerprint detector unit can also be incorporated into other communication devices, such as legacy non-wireless phones, to provide automated security features. Such automated security features may become necessary to prevent fraud in the many growing number of services, such as used in stock trading by computer (see co-pending application Ser. No. 08/970,769).

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0014] **FIG. 1** shows a diagram depicting the major AWPS Subsystem Elements. Four types of APTRU units are shown representing the most common proximity service providers, such as access and credit card systems in use today. Also the four most common mediums utilized by communication service providers for connecting phones/pagers and data processing centers today are shown including the Internet link. A single AWP unit is shown in **FIG. 1** interfacing with all of these systems.

[0015] **FIG. 2** shows the AWP unit and the signal flow logic in more detail. Those portions required to turn an existing Wireless digital Phone/pager are shown grouped separately from the existing elements available in state of the art digital wireless phone/pager. The existing elements are grouped and referred to as the Existing Legacy phone/pager Capabilities.

[0016] **FIG. 3** shows a generic conversion process flow diagram example that is at the heart of the APTRU processing unit that interfaces with the existing legacy proximity service processing units of the various types shown in **FIG. 1**.

[0017] **FIG. 4** shows the elements and logic flow diagram for a Toll access system.

[0018] **FIG. 5** shows the elements and logic flow diagram for an ATM dispensing system.

[0019] **FIG. 6** shows the elements and logic flow diagram for a Gas Pump access system.

[0020] **FIG. 7** shows the elements and logic flow diagram for a store checkout system.

[0021] **FIG. 8** shows the elements and logic flow diagram for adding the finger print detector unit to the wireless AWP unit.

[0022] **FIG. 9** shows a schematic view of a geographical territory which has been characterized as a local area and a roaming area.

[0023] **FIG. 10** shows the elements of logic flow diagram for a telephone dialing system constructed in accordance with the present invention.

DETAILED DESCRIPTION OF INVENTION

[0024] Referring to the **FIG. 1**, an AWPS **5** is depicted and is comprised of an AWP unit or portable electronic communication device **10**, connected to communication service providers **45**, via a communication unit **11** supported by the AWP unit **10** and capable of communicating with wireless ground station or satellite links **14** or **16** via a first signal type. The AWP unit **10** includes a portable housing **17**. The portable housing **17** of the AWP unit **10** supports the communication unit **11** and other components of the AWP unit **10**, including the memory of the AWP unit **10**. The links **14** or **16** can be bi-directional communication links. The communication service providers **45** can be telephone communication companies, such as AT&T, SBC Communications, Air Touch Communications, NexTel, or the like. The AWP units **10** are also connected to the various types of proximity service providers **20** by the communication unit **11** and with a second signal type.

[0025] The first signal type can be a high-power radio frequency type signal (which is sometimes referred to herein as a "high power mode") utilized by wireless telephones and pagers, for example. The second signal type can be a low power radio frequency type signal (which is sometimes referred to herein as a "low power mode") utilized in communication systems involving relatively short distances of less than one-mile, for example. For example, the second signal type can be low power radio frequency signal, or a light signal generated by an LED, or a communication signal transmitted over a cable, for example. The first and second signal types may be the same or different signal types depending on the particular application of the AWPS **5**.

[0026] The proximity service providers **20** can be access and credit card units such as a toll booth unit **22**, an ATM unit **24**, a gas station pump **26**, and a store checkout station **28**. Although not specifically shown in **FIG. 1**, the proximity service provider **20** can also be a television or other device having a remote control communication system, a garage door opener or other proximity service providers which receive signals transmitted from a relatively short distance away as discussed above.

[0027] The Toll Booth unit **22** is shown being wireless connected to the AWP unit **10** via link **21** and communication unit **11**. The ATM unit **24** is shown being wireless connected to the AWP unit **10** via link **23** and communication unit **11**. The Gas Station Pump **26** is shown being wireless connected to the AWP unit **10** via link **25** and communication unit **11**. The Store check out station **28** is shown being wireless connected to the AWP unit **10** via link **27** and communication unit **11**. The links **21**, **23**, **25**, and **27** can be any suitable bi-directional communication link and the communication unit **11** can be any suitable bidirectional communication device, for example. All of these proximity service providers **20** are connected to their respective Data processing Business centers, if any, via link **29** to the communication service provider **45** and then to the business center **50** thereof via link **60**. By way of example an AWP unit owner may be using their AWP unit **10** via link **14** in one of the normal communication modes such as voice or data delivery and at the same time being granted access through a toll booth **22** by the same AWP unit **10** (simultaneous dual signaling mode).

[0028] The wireless cellular network links are shown in **45** and they direct the AWP unit **10** communication call charges to the billing data processing centers **50** via link **60**. The toll booth **22** charges can be directed to this same central billing system **50** via standard phone lines **29** and connection **60** or they can be billed separately using the old legacy toll booth billing system.

[0029] In **FIG. 1** the method to automatically insert a unique code generated from the AWP unit **10** owner starts with the fingerprint detector unit **12**. The finger print detector unit **12** generates a unique code that can be automatically used to provide security to the proximity service providers **20** or used as supplemental security to other codes such as PIN numbers currently required by some proximity service providers **20**.

[0030] In **FIG. 2** the AWP unit **10** of **FIG. 1** is further described in terms of various proximity service features **100** that utilize the existing legacy wireless phone/pager capabilities **180** when the AWP unit **10** is embodied in a wireless telephone (which includes a telephone transmitter unit, a telephone receiver unit, a microphone for receiving voice or data, and a speaker or display for outputting information received from the telephone transmitter unit from the communication service provider) or pager (which includes a portable housing supporting a receiver unit for receiving information from the communication service provider). The making and using of the existing legacy phone capabilities **180** are well known in the art. The existing capabilities **180** include the ability to insert names and phone numbers into the phone/pager computer memory following menu instruction shown on the display. This same process may be used in the new invention as one means to insert personal information codes, such as credit card numbers, Personal Identification numbers and access codes into the AWP unit **10** for use with the various proximity services offered by the proximity service provider **20**. Another means to insert personal information codes into the AWP unit **10** is by letting the proximity service provider **20** insert the personal information codes in a secure fashion with the encryption means the proximity service provider **20** chooses. Thus in some cases the user can insert the personal information codes, such as proximity service codes, and in other cases the proximity service provider **20** inserts the personal information codes, such as proximity service codes.

[0031] Examples of uses of the present invention where it may be desirable to permit the proximity service provider **20** to insert the personal identification codes into the AWP unit **10** are security access codes, smart cards holding money, debit cards, and maybe even credit cards, except for the PIN numbers which may be inserted by the user via an input unit such as the alphanumeric keyboard included in the existing legacy phone capabilities **180**.

[0032] The new services **100** include a proximity services mode switch **110** which can be activated manually or automatically via an auto activate mode unit **115** which would be turned on via link **116** when a signal was received by a T/R available signal detector unit located in the existing legacy phone capabilities **180**. Once the Advanced Proximity Transmitter Receiver Unit (APTRU) of one of the proximity service providers **20** is detected by the AWP unit **10** via one of the lines **21**, **23**, **25**, or **27** while in the auto activate mode, the unit **115** turns on the unit **110** via link **118** and a proximity service unit **140** then selects the correct proximity service automatically.

[0033] The selection of the manual or automatic mode can be one of the menu setup options available in a proximity menu unit **130** and can be accomplished by the user manipulating the alphanumeric keyboard included in the existing legacy phone capabilities **180**. The proximity menu unit **130** represents a new service capability added to the main macro setup menu of the legacy computer menu functions shown in the existing legacy phone capabilities **180**. Once the proximity services mode switch **110** is activated either manually or automatically as just described, the switch **110** causes a mode of operation for communicating with the proximity service provider **20** to be activated by a unit **120** via line **122** sent to the transmitter/receiver located in **180**. The unit **120**, for causing the mode of operation for communicating with the proximity service provider **20** to be activated, is shown in **FIG. 2** as a "low power transmitter mode" by way of example.

[0034] Also the desired proximity service is selected either automatically or manually via a unit **140** and then a selected service signaling unit **150** is activated via link **144**, and the legacy unit **180** is notified via link **142**. In turn the unit **150** notifies the legacy unit **180** or the type of service signaling to expect and simultaneously notifies the selected service protocol unit **170** via line **154**.

[0035] The fingerprint detector unit **12** can be activated in all selected service modes and feeds the users fingerprint code into the protocol unit **170** via line **162** as described more fully in connection with **FIG. 8**.

[0036] Finally all of the proper protocol information associated with the selected service such as Toll Tag, parking lot entry, ATM dispensing, Gas pump dispensing, automatic vehicle monitoring, and others that may be provided by the AWP unit **10** to the proximity service provider **20** is stored in unit **170**. The predetermined protocols associated with the selected service is sent over to the legacy computer system in the existing legacy phone capabilities **180** via link **172** for proper processing of the security and other validation functions prior to transmission to one of the proximity service providers **20** via one of the lines **21, 23, 25** or **27**.

[0037] The actual data processing is performed by a proximity service program selected by signal **142** and stored in the legacy digital communication computer located in the existing legacy phone capabilities **180** while the AWP unit **10** is in communication with one of the proximity service providers **20** more fully described in FIGS. **3** to **8**. In accordance with the present invention, a proximity service program is stored in the existing legacy phone capabilities **180** of the AWP unit **10**. The proximity service program is associated with each of the proximity services offered by the proximity service provider **20**.

[0038] In one embodiment, the low power signaling (or other type of communication with the proximity service provider **20**) via one of the links **21, 23, 25** or **27** can operate while the existing legacy phone capabilities **180** of the AWP unit **10** operates in the normal high power communication mode (or other suitable type of communication mode) via one of the links **14** or **16** in between the AWP unit **10** and legacy unit **180** high power signal bursts. This is referred to as the simultaneous dual power mode. In the simultaneous dual power mode, the user can be receiving messages (voice or data) on the AWP unit **10** from the communication service provider **45** while the AWP unit **10** is communicating with one of the proximity service providers **20** to effect a transaction, such as when the user is driving through a toll gate or paying for groceries at a checkout counter or utilizing some other proximity service provider **20**.

[0039] The additional security provided by a built in finger print detector unit **12**, provides a system that is secure and practical in the 21st century. However this feature could just be an option.

[0040] The description provided above will allow any one skilled in the art to quickly design a modification to an existing legacy Wireless phone/pager or palm top computer such as a Nokia 9000 wireless phone/pager, or an advanced 3com palm pilot III mobile computer respectively (these do not have phone/pager capability but may in the near future).

[0041] One of the more important benefits of the invention is that the modifications required to add the AWP unit **10** capability to the existing proximity service providers **20** such as mentioned above is even simpler than the modifications required to the existing digital wireless phone/pager or palm top computers. All that is required is a very simple rf, or LED Proximity Transmitter and Receiver Unit or other bi-directional communication device, such as a physical docking or plug-in station for the AWP unit **10**, that includes a proximity converter unit that interfaces the AWP unit T/R signals with the existing legacy proximity service provider communication unit with the correct protocols. In **FIG. 3** such a generic APTRU **20** is shown in terms of the AWP adapter unit **200** and the existing generic legacy system functions **280**. The legacy system functions **280** include an input unit (not shown) for reading at least one personal information code from a hard copy (e.g. credit card, debit card or the like) capable of being carried by an individual. The AWP adapter unit **200** has an AWP unit signal receiver unit **210** that receives the AWP unit **10** signals via one of the links **21, 23, 25** or **27**.

[0042] The receiver detected signals are sent to the demodulator unit **220** via line **212**. The demodulated signals are then sent to the proximity converter unit **230** via line **221** for interfacing with the legacy system unit **280** via line **232**. Signals going back to the AWP unit **10** are first sent from the legacy unit **280** via line **232** to the proximity converter unit **230**. The signal is then converted into the proper form for transmission and sent to the AWP modulator unit **240** via line **231**. The modulated signal is then sent to the low power AWP signal transmitter unit **250** which transmits back to the AWP unit **10** via one of the links **21,23,25**, or **27**.

[0043] In FIGS. **4** through **FIG. 7** the APTRU units for the four proximity service providers **20** used in the invention description are presented. The numbering systems have been changed to distinguish each of the four proximity service providers **20** and the legacy function for each type proximity service provider **20** are given in each of the figures legacy unit. Also the specific communication link **21, 23, 25** or **27** is shown corresponding to the service center depicted in **FIG. 1**. The description of signal and logic flow is similar to that described in connection with the generic unit of **FIG. 3** and will not be repeated for the sake of brevity.

[0044] **FIG. 8** depicts how the finger print detector unit **12** signals are generated and flow between the AWP unit **10** and the proximity service provider **20** of the AWPS **5**. When the finger print detector unit **12** is activated by the proximity services mode switch **110** via line **112** then a finger print system **780** (these are predetermined functions available with any existing finger print sensor reader unit) generates a finger print code characterizing the users finger print and sends them over via line **785** to the AWP finger print adapter unit **700** located in finger print detector unit **12**. The finger print system **780** is supported by the housing **17** and is positioned to receive at least a portion of an individual's finger. The AWP finger print adapter unit **700** has a print code converter **710** that converts the users finger prints into the predetermined codes using predetermined algorithms selected by the proximity service provider **20** and sends these codes to the print code unit **720** via line **715**. The print code unit **720** provides these signals to the protocol unit **170** via line **725** which in turn sends them to the existing legacy unit **180** via line **172**. The legacy unit **180** then transmits these codes to the various proximity service providers **20** via transmissions **21, 23, 25, 27** or other service centers not

shown. The finger print coded information is thus made available to the proximity service providers **20** for validation and authorization purposes.

[0045] The AWPS **5** can be utilized as follows. The proximity service provider **20** can be the store checkout station **28** located at a point of use such as a grocery store for example. In this embodiment, the user carries the AWP unit **10** into the grocery store and then selects at least one product for purchase. The user transports the AWP unit **10** and the products to the store checkout station **28**. The UPC code on the product is entered into the store checkout station **28**, such as by scanning the UPC code with a suitable scanner. The UPC or unique code identifying the product can be batched in the store checkout station **28** while the UPC codes of other products are entered into the store checkout station or otherwise until the user's transaction is complete. A product checkout price is requested from the user for payment. The user then actuates the proximity services mode switch **110** (**FIG. 2**) to cause the AWP unit **10** to download the personal information code and predetermined protocols to the AWP store checkout adapter unit **600** of the checkout station **28** as discussed above with reference to **FIGS. 2 and 7**. If additional security is desired, the user can place one of his fingers on the finger print system **780** (**FIG. 8**) to generate the unique codes which are indicative of the user's fingerprint. The unique codes can then be downloaded or transmitted to the AWP store checkout adapter unit **600** as discussed above. The operation of the AWP unit **10** and the store checkout station **28** has been discussed above and will not be repeated for sake of brevity.

[0046] In any event, the personal information code, predetermined protocols, and possibly the unique fingerprint code, are transmitted from the store checkout station **28** to a third party, such as a credit card company, for automated payment verification as indicated by the line **29**. If the personal information code and unique fingerprint code are valid and the transaction is authorized, the third party transmits a signal to this effect to the store checkout station **28** via the link **29** and the transaction will be effected.

[0047] As discussed above, the proximity service provider **20** can be the ATM unit **24**. In this embodiment, the AWPS **5** can be utilized as follows. The user transports the AWP unit **10** to the ATM unit **24**. The user then actuates the proximity services mode switch **110** (**FIG. 2**) to cause the AWP unit **10** to download the personal information code and other predetermined protocols to the AWP ATM adapter unit **400** of the ATM unit **24** as discussed above with reference to **FIGS. 2 and 5**. If additional security is desired, the user can place one of his fingers on the finger print system **780** (**FIG. 8**) to generate the unique codes which are indicative of the user's fingerprint. The unique codes can then be downloaded or transmitted to the AWP store checkout adapter unit **400** as discussed above. The operation of the AWP unit **10** and the ATM unit **24** has been discussed above and will not be repeated for sake of brevity. The user then enters in a withdrawal amount into the ATM keyboard unit and a pin number, if desired. The personal information code, withdrawal amount, and possibly the unique fingerprint code or the pin number, are transmitted from the ATM unit **24** to a third party, such as a bank, for automated payment verification as indicated by the line **29**.

[0048] The processes for utilizing the AWP unit **10** with the toll booth **22**, and the gas station pump **26** are similar to the processes for utilizing the AWP unit **10** with the ATM unit **24** and the store checkout station **28**, except as described hereinafter. When the AWP unit **10** is being utilized with the toll booth **22**, the auto activate mode unit **115** in the AWP unit **10** is turned on via link **116** when a signal is received by a T/R available signal detector unit located in the existing legacy phone capabilities **180**. The personal information code and predetermined protocols are then transmitted to the toll booth unit **22** for automatic accounting of the toll booth charges, as discussed above. When the AWP unit **10** is being utilized with the gas station pump **26**, the user transmits the personal information codes and predetermined protocols to the gas station pump **26** via the link **25** as best shown in **FIGS. 1 and 6**. The gas station pump **26** then transmits the personal information codes and predetermined protocols to a third party, such as a credit card company, via the link **29** for payment authorization prior to the pumping of the gas. When authorization is received, the gas station pump **26** is actuated to permit the user to pump the gas into his gas tank.

[0049] While the AWP unit **10** is communicating with the toll booth **22**, the ATM unit **24**, the gas station pump **26**, or the store checkout station **28** (proximity service providers **20**) the AWP unit **10** may also be communicating with the communication service provider **45** to permit the user to place telephone calls, receive pages, or receive and respond to e-mail, for example.

[0050] Referring now to **FIG. 9**, a geographical territory **800** has been characterized as having a local area **802** and a roaming area **804**. The roaming area **804** is located outside the local area **802**. Conventionally, communication service providers **45** require or do not require the use of dialing prefix codes, such as billing ("1" or "0") or area codes, based upon the location of the telephone within the geographical territory **800**. For example, if the telephone is located in the local area **802** and the telephone is being used to call a number associated with the local area **802**, a prefix, such as "1" or "0" preceding the number, may not be required. However, when the telephone is located outside the local area **802** (i.e. the roaming area **804**) and the telephone code or number being dialed is associated with the local area, a prefix such as "1" or "0" and an area code preceding the telephone code number may be necessary.

[0051] In the embodiment depicted in **FIG. 2**, the AWP unit **10** includes the legacy digital computer **180**. The digital computer **180** is adapted to determine whether the AWP unit **10** is positioned in the roaming area **804** or the local area **802**. In accordance with the present invention, the digital computer **180** is programmed to add a predetermined prefix, such as the number one plus the area code, to a local telephone code stored in the memory unit of the AWP unit **10**, in response to the determination that the AWP unit **10** is currently positioned in the roaming area **804**. The digital computer **180** may also be adapted to determine whether the AWP unit **10** is positioned in the roaming area **804** and to remove the predetermined prefix, such as the number one plus the area code, the predetermined prefix being stored in the memory unit and running on the digital computer **180**, from the long-distance telephone code responsive to the determination that the AWP unit **10** is positioned in the roaming area **804**.

[0052] Referring now to **FIG. 10**, the logic flow diagram for the computer program telephone dialing system **820** is

shown. After the individual selects the local telephone code for dialing, the first step **822** is to determine the location of the AWP unit **10**. Where the AWP unit **10** is located within the local area **802**, the process branches **824** to the dialing step **826** and the local telephone code is dialed. Where it is determined that the AWP unit **10** is located in the roaming area **804**, the process branches to a step **830** as indicated by the line **828**. At the step **830**, the characteristics of the stored number are determined. The determination that the stored number is a local telephone code causes the process to branch to step **834** as indicated by the line **832**. At the step **834**, the digital computer **180** adds a predetermined prefix, such as the number one and the area code associated with the local telephone code, to the local telephone code. The corresponding prefix, such as the area code, may have been previously entered and stored within the digital computer **180**. Thereafter, the program branches to the step **826** to dial the local telephone code with the prefix added. However, where the characteristics of the stored number **830** result in the determination that the stored number is non-local, the process branches to a step **838** as indicated by the line **836**.

[0053] The step **838** determines whether the predetermined prefix for the long-distance telephone code, such as the area code, matches the prefix for the long-distance telephone code applicable to the roaming area **804** where the AWP unit **10** is currently located. This may be accomplished, for example, by the digital computer **180** communicating with the communication service provider **45** during the communication session when determining the location of the AWP unit **10**. Where the codes are equivalent, such as where the area code prefix of the stored long-distance telephone code matches the area code of the current location of the AWP unit **10**, the process branches to a step **842** as indicated by the line **840**. At the step **842**, the prefix, such as the number one and the area code, is removed from the long-distance telephone code. Then, the modified long-distance telephone code is dialed at the step **826** as indicated by the line **844**.

[0054] Where the step **838** determines that the predetermined prefix for the long-distance telephone code of the stored number, such as the area code, does not match the prefix for the long-distance telephone code applicable to the roaming area **804** where the AWP unit **10** is currently located, the process branches to the step **826** to dial the long-distance telephone code as it was stored in the digital computer **180** of the AWP unit **10**, as indicated by the line **846**.

[0055] Changes may be made in the steps or sequence of steps or the construction or operation or mode methods described herein without departing from the spirit and the scope of the invention as defined in the following claims.

What is claimed is:

1. A system for providing a predetermined service to effect a transaction, comprising:

a plurality of proximity service providers, each of the proximity service providers adapted to provide a different predetermined service, each of the proximity service providers comprising:

a proximity receiver unit for receiving at least one personal information code;

an output unit receiving the personal information code from the proximity receiver unit for outputting the personal information code to a third party to obtain validation before providing the predetermined service to effect the transaction;

a wireless unit separate from the proximity service provider, the wireless unit comprising:

a portable housing adapted to be carried by an individual;

a memory unit supported by the housing, the memory unit storing, prior to initiation of the transaction, at least one personal information code in a manner capable of being retrieved; and

a communication unit supported by the housing for receiving information from a communication service provider and for retrieving and outputting the personal information code to the proximity receiver unit of the proximity service provider, without effecting the communication service provider, to activate the proximity service provider and thereby effect the transaction.

2. The system as defined in claim 1, wherein at least two separate personal information codes are stored in the memory unit and wherein the communication unit is further defined as outputting one of the personal information codes selected by the individual.

3. The system as defined in claim 1, wherein the wireless unit includes a telephone transmitter unit for transmitting the information to the communication service provider.

4. The system as defined in claim 3, wherein the communication unit includes a high power transmitter mode for communicating with the communication service provider and a low power transmitter mode for outputting the personal information code to the proximity service provider located within a predetermined proximity distance.

5. The system as defined in claim 1, further comprising a fingerprint detector unit supported by the housing and positioned to receive at least a portion of an individual's finger so as to selectively generate a fingerprint code indicative of at least a portion of the fingerprint of the individual.

6. The system as defined in claim 1, wherein the communication unit is capable of about simultaneously outputting signals to the communication service provider and the proximity service provider located within a predetermined proximity distance.

7. The system as defined in claim 1, wherein the wireless unit is a telephone.

8. The system as defined in claim 1, wherein the wireless unit is a pager.

9. A method for providing a predetermined service to effect a transaction, comprising:

transporting, by an individual, a wireless unit in close proximity to one of a plurality of proximity service providers with each proximity service provider adapted to provide a different predetermined service upon activation;

storing at least one personal information code in a manner capable of being retrieved in a memory unit of the wireless unit;

communicating, via the wireless unit, with a communication service provider after the personal information code is stored in the memory unit of the wireless unit;

outputting, via the wireless unit, the personal information code to the proximity service provider, without effecting the communication service provider;

receiving, via the proximity service provider, the personal information code output by the wireless unit; and

outputting, via the proximity service provider, the personal information code to a third party to obtain validation before providing the predetermined service.

10. The method defined in claim 9, wherein at least two separate personal information codes are stored in the memory unit and wherein the method further comprises the step of selecting, by the individual, one of the personal information codes.

11. The method as defined in claim 9, wherein the step of communicating, via the wireless unit, is further defined as communicating via a telephone transmitter unit of the wireless unit for communicating with the communication service provider.

12. The method as defined in claim 11, wherein the method is further defined as the communicating with the communication service provider in a high power transmitter mode and outputting, via the wireless unit, the personal information code to the proximity service provider in a low-power mode.

13. The method as defined in claim 9, further comprising the step of positioning the individual's finger on a fingerprint detector unit supported by the wireless unit and selectively generating a fingerprint code indicative of at least a portion of the fingerprint of the individual.

14. The method as defined in claim 9, wherein the steps of communicating and outputting occur about simultaneously.

15. The method as defined in claim 9, wherein the wireless unit is a telephone.

16. The method as defined in claim 9, wherein the wireless unit is a pager.

17. A method for providing communication services, comprising the steps of:

converting, via a wireless telephone, voice and keyboard information to be transmitted to a communication service provider located remotely from the wireless telephone via a telephone transmitter unit;

receiving information by a telephone receiver unit of the wireless telephone from the communication service provider;

outputting the information received by the telephone receiver unit in a format perceivable by an individual;

storing at least one personal information code in a manner capable of being retrieved in the wireless telephone;

transporting the wireless unit in close proximity to one of a plurality of proximity service providers with each proximity service provider adapted to provide a different predetermined service upon activation;

outputting, via the wireless telephone, the personal information code to one of the proximity service providers, without effecting the communication service provider, whereby upon receipt of the personal information code the proximity service provider is activated to provide a predetermined service.

18. The method as defined in claim 17, further comprising the step of inserting at least one personal information code into the memory unit from a location remote from the wireless telephone.

19. The method as defined in claim 17, further comprising the steps of automatically receiving a proximity service code from one of the proximity service providers, and automatically outputting the personal information code responsive to the reception of the proximity service code.

20. The method as defined in claim 17, wherein the proximity service provider is further defined as a toll booth unit.

21. The method as defined in claim 17, wherein the proximity service provider is further defined as a store checkout station.

22. The method as defined in claim 17, wherein the proximity service provider is further defined as an ATM unit.

23. The method as defined in claim 17, wherein the proximity service provider is further defined as a gas station pump unit.

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